

GEOLOGICAL CONDITIONS AS AFFECTING WATER
CONSERVATION IN THE CHUDLEIGH LAKES DISTRICT

DAM SITE AT LAKE MCKENZIE

Only one dam site was examined in connection with the investigation being carried out by the Hydro-Electric Department. This was stated to be the biggest and most important dam scheme and is situated at the outlet of Lake McKenzie.

The dam is a long one and for the greater part of its length would rest on glacial morainal material. This moraine is of special interest and importance in view of the fact that it is consolidated and cemented to a very pronounced extent. It most probably represents a moraine deposited by the ice sheet, which covered the area in a period preceding the formation of the mountain glaciers which have given most of the moraines already studied. It is therefore older and consequently more consolidated than these latter younger moraines.

Taking into consideration the proposed height of the dam and the degree of cementation of the moraine, I am of the opinion that the conditions are safe for the erection of such a dam.

The weaknesses that occur on the line of the proposed dam are located at the spot where the moraine abuts on the solid diabase bed rock at the southern end, and also in places on the northern side of the Lake outlet. It would therefore be advisable to specially examine these points where the diabase highlands rise up through the moraine so as to provide for any potential weakness at these points.

It would also be a wise precaution to put a series of bore holes down to ascertain what depth of the moraine there is between the proposed bottom of the dam and the bed rock underneath.

One possible danger that exists is the occurrence between the moraine and the diabase bed rock, which is in places highly polished by ice action, of a layer of pug. This condition is shown in one test pit, and if it were present to any extent it would of course weaken the support for the foundation.

If these preliminary precautions are taken the amount of risk in dam construction will be reduced to a minimum.

CONDITIONS FOR TUNNELLING THROUGH THE LIP
OF THE TIER

(1) North-west of Lobster Creek.

The conditions existing in this locality in regard to tunnelling at the level proposed are shown in the drawing submitted herewith. In this drawing the red line shows the old cliff of the Tier and the land surface before the collapse of the mountain side took place. This collapse was caused by the undercutting of the sandstone beneath the diabase as shown in the section. The collapse of the diabase above the undercut has produced the existing conditions of the tumultuous assemblages of diabase columns orientated at all angles. The line of the proposed tunnel would pass through approximately 800 to 1000 feet of this mass of diabase columns. To tunnel through this would not

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be impossible but so difficult and costly as, in my opinion, to be quite impracticable. Not only is there the danger of displacing the "king" column and setting the mass moving again, but steel frames would be necessary to hold up the ground, and to make it water-tight a very large amount of concreting would be necessary.

The difficulties of driving a tunnel in this locality therefore are very great.

(2) Near Caveside Track

The tunnel at the proposed level in this vicinity will pass through solid diabase to sandstone which will be encountered at either 200 or 400 feet from the northern outlet according as to whether the geological structure is represented, as shown in the accompanying section, either by the continuous black line as the edge of the diabase or the broken black line. It is impossible to say on the geological evidence which of these structures exists, but in any case I do not think that more than 400 feet of sandstone can be calculated on, and most probably only about 200.

Conditions at this locality are quite favorable, therefore, for driving a tunnel.

(3) Near Mole Creek Track

Tunnelling in this locality would be driving wholly in diabase, and there is no danger of meeting collapsed ground as near Lobster Creek. For roughly the last 100 feet on the northern end blocks of diabase, representing detrital accumulations, will have to be passed through, but this will not be a very serious task.

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